

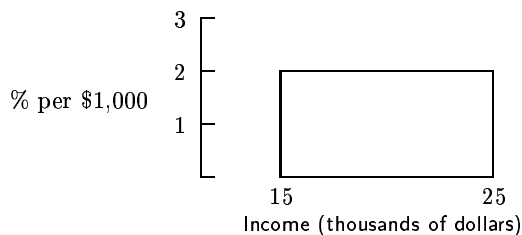
Sample of Final Examination Questions

Math 125 Fall 2016

On the final to get full credit you **must show your work**. No work, no credit.

The final will have ten questions, each worth 10 points.

1. The sketch below shows one block of the family-income histogram for a certain city. About what percent of the families in the city had incomes between \$18,000 and \$25,000?



2. A survey of a large group of men found that their average height was 67 inches with an SD of 4 inches.
 - (a) A 72.4-inch man has what percentile rank in height? (Assume normal curve.)
 - (b) How tall is a man whose percentile rank in height is 40%? (Assume normal.)
 - (c) Assuming the normal curve, about what percentage of these men are between 62 and 66 inches tall?
3. The observed ages of a group of interns at a local hospital were:

$\{33, 37, 32, 27, 28, 36, 38\}$.

- (a) Find the median of this list.
- (b) Find the mode of this list.
- (c) Find the average and the standard deviation of this list of ages. (Show your work.)
- (d) How many of the ages were within $\frac{1}{2}$ SD of the average age?
- (e) How many of the ages were within 1.75 SDs of the average age?
- (f) Using the results of part (a), convert the observed value of 28 to standard units.

4. For the data set below:

x	y	
3	4	(a) find r , the correlation coefficient.
3	2	(b) based on these calculations, predict y when $x = 1.5$.
1	1	
3	5	(c) find the root-mean-square error of the regression line
4	5	that is used to predict y from x .
4	7	(d) find the slope of that regression line.

5. Two draws will be made at random from a deck of cards. The unconditional probability of getting the king of hearts on the first draw is $1/52$. The unconditional probability of getting the king of hearts on the second draw is $1/52$.

- (a) The chance that the first draw turns out to be the king of hearts and the second draw turns out to be the king of hearts is $1/52 \times 1/52 = 1/2704$ when the draws are made _____ replacement, because then the events are _____.
- (b) The chance that at least one of the two draws turns out to be the king of hearts must be calculated as $1 - (51/52 \times 51/52) = 103/2704$ when the draws are made _____ replacement, because then the events are not _____.
- (c) The chance that neither of the two draws turns out to be the king of hearts is $51/52 \times 50/51 = 50/52 = 25/26$ when the draws are made _____ replacement, because then the draws are not _____.

Fill in the blanks using one option from each pair below for each sentence.

(with, without) (independent, mutually exclusive)

6. A box contains one red marble and nine green ones. Five draws are made at random with replacement.

True or false: the chance that exactly two draws will be red is

$$10 \times \left(\frac{1}{10}\right)^2 \left(\frac{9}{10}\right)^3.$$

SAMPLE of FINAL EXAM QUESTIONS - MATH 125 (December 2016) 3

7. A die is rolled one thousand times. The percentage of aces (\square) should be around _____, give or take _____ or so.

(a) The first step in solving this problem is

- i. computing the SD of the box.
- ii. computing the average of the box.
- iii. setting up the box model.

Choose one option and explain.

(b) Now solve the problem.

(c) Find the chance that the percentage of aces in the one thousand rolls is 19 or more.

(d) For more rolls, would the give or take go up or down?

(e) Find the number of rolls necessary for the give or take to be 0.25%.

8. A survey organization takes a simple random sample of 625 households from a city of 80,000 households. On the average, there are 2.30 persons per sample household, and the SD is 1.75. Say whether each of the following statements is true or false, and explain.

(a) The SE for the sample average is 0.07.

(b) Since only one sample was taken, it would be improper to use a confidence interval to estimate the average household size in the city.

(c) A 95%-confidence interval for the average household size in the city is 2.16 to 2.44.

(d) The 95%-confidence level is about right because household size follows the normal curve.

(e) The 95%-confidence level is about right because, with 625 draws from the box, the probability histogram for the average of the draws follows the normal curve.

9. An ESP experiment asks the subject to guess unseen which target was chosen randomly from 10 targets by the researcher. Suppose that in 1,000 trials, a subject scores 173 correct guesses.

- (a) Set up the null hypothesis as a box model.
- (b) The SD of the box is _____. Fill in the blank, using one of the options below, and explain briefly.

$$\sqrt{0.1 \times 0.9} \qquad \sqrt{0.173 \times 0.827}$$

- (c) Make the z -test.
- (d) What do you conclude?

10. One day, upon tossing a single die 600 times, I got:

108 ones, 93 twos, 114 threes, 120 fours, 93 fives, and 72 sixes.

Compute χ^2 and find P for this experiment. Is the die biased, based on those 600 tosses?

Justify your conclusion by comparing the P -value you obtained to the benchmark (5% or 1%) that you are using.